### **APPENDICES**

Report of the New Millennium Occoquan Watershed Task Force Final January 27, 2003

# TASK FORCE MEMBERS AND PRESENTERS APPENDIX A

#### **Task Force Members**

Members	Agency/Organization
Kambiz Agazi	Fairfax County Environmental Coordinator, County Executive's
	Office
Jeanne Bailey	Public Affairs Officer, Fairfax County Water Authority
Jeff Blackford	Deputy Director, Office of Site Development Services
	Department of Public Works and Environmental Services
Carl Bouchard	Director, Stormwater Planning Division
	Department of Public Works and Environmental Services
David Bulova, Co-Chair	Former Director of Environmental Services, Northern Virginia
	Regional Commission (NVRC)
Cliff Fairweather	Director, Webb Sanctuary, Audubon Naturalist Society (ANS)
Judith Heisinger	Sully District Appointee, President, Bull Run Civic Association
Irish Grandfield	Planning Section Supervisor, Fairfax County Park Authority
Dr. Tom Grizzard	Director, Occoquan Watershed Monitoring Lab (OWML)
Dennis Hill	Director of Environmental Health, Fairfax County Health
	Department
Maya Huber	Fairfax County Federation of Citizens Associations
Noel Kaplan	Environmental and Development Review Branch
·	Department of Planning and Zoning
Dr. Evelyn Mahieu	Upper Occoquan Sewage Authority (UOSA)
Mary Nightlinger	Northern Virginia Soil and Water Conservation District (NVSWD)
Peyton Onks	Staff, Supervisor Elaine McConnell
Jean Packard	Braddock District Appointee
	Former Chairman, Fairfax County Board of Supervisors,
	NVSWCD
Merrily Pierce	Office of the Chairman, Fairfax County Board of Supervisors
Michael Riesenman	Manager, Occoquan Regional Park, Northern Virginia Regional
	Park Authority (NVRPA)
Leslie Vandivere	League of Women Voters of the Fairfax Area
Dr. David Schnare, Co-Chair	Occoquan Watershed Coalition
Alex Vanegas	President, Friends of the Occoquan
Other Participants	Agency/Organization
Normand Goulet	Northern Virginia Regional Commission
Sally Ormsby	Fairfax County Federation of Citizens Associations

#### **Task Force Presenters**

Robert L. Howell, Former Assistant County Attorney
David Bulova, Northern Virginia Regional Commission
David Schnare, Occoquan Watershed Coalition
Jeanne Bailey, Fairfax County Water Authority
Tom Grizzard, Occoquan Watershed Monitoring Lab
Laura Grape, Fairfax County Department of Public Works and Environmental Services
Cliff Fairweather, Audubon Naturalist Society, Webb Sanctuary
Noel Kaplan, Fairfax County Department of Planning and Zoning
Irish Grandfield, Fairfax County Park Authority

Jeff Blackford, Fairfax County Department of Public Works and Environmental Services
Dennis Hill, Fairfax County Health Department
Joanna Arciszewsi, Northern Virginia Soil and Water Conservation District

#### **BOARD OF SUPERVISORS RECORD**

(Approval of 20th Anniversary "Year of the Occoquan," authorization and appointment of New Millennium Occoquan Watershed Task Force and Study, and Board presentation of Proclamation and certificates)

#### **APPENDIX B**

#### **CLERK'S BOARD SUMMARY**

REPORT OF ACTIONS OF THE FAIRFAX COUNTY BOARD OF SUPERVISORS MONDAY

VIII. March 18, 2002

#### 47. OCCOQUAN WATERSHED YEAR (Tape 5)

(BACs) Chairman Hanley stated that this year marks the twentieth anniversary of the Board's decision to downzone approximately 41,000 of the 63,000 acres (about 63 percent) of the land comprising the Occoquan Basin portion of Fairfax County. The action occurred on July 26, 1982. She noted that there was also an upzoning of a portion of the land within the basin. The purpose of the downzoning was the recognized need to protect the viability of the Occoquan River and its watershed that now supplies more than a million residents with their water. The County's Baseline 2000 Stream Protection Strategy Study found the County's healthiest streams in the Occoquan Watershed and as of March 14, 2002, the Occoquan Reservoir was 88 percent full, despite record low rainfall. She noted how the nation has become more aware of the need for protection and preservation of water supplies.

In recognition of the foresight of the Board, Chairman Hanley moved that the Board:

- Designate 2002 as "Occoquan Watershed Year" in celebration of the downzoning decision.
- Approve a proclamation recognizing the decision to be framed and posted in the Atrium of the Government Center.
- Approve a presentation before the Board of Supervisors honoring those who were instrumental in realizing the vision.
- Approve a presentation of certificates recognizing those groups that have been and continue to be stewards of the watershed.
- Approve a display at the Fairfax Fair in June, with County agency participation, that documents the decision and its benefits to the watershed.
- Approve the establishment of the New Millennium Occoquan Watershed Task Force to examine the impacts of increasing population, stormwater management, and other challenges in the watershed and to present its findings and recommendations to the Board. The task force should include representatives from appropriate County agencies, the Park Authority, Northern Virginia Soil and Water Conservation District, Northern Virginia Regional Commission, Northern Virginia Regional Park Authority, the Occoquan Watershed Coalition, Audubon Naturalist organization, Health Department, and stakeholder representatives.

- Approve the designation of the Office of Public Affairs to assist in coordination of events associated with the fair and other events that might be held during the rest of the year celebrating the event in the Occoquan Watershed.
- Approve a web page on the County's website dedicated to educating the public about the decision.
- Approve the coordination with the schools in that part of the County to provide educational materials on the Occoquan Watershed.

Supervisor Connolly and Supervisor McConnell jointly seconded the motion.

Supervisor Connolly asked unanimous consent that the Board direct staff to prepare a fact sheet as part of this effort. He said that the downzoning action should be put in context for citizens to understand the impact as to what was averted and a comparison with neighboring jurisdictions and their efforts. Without objection, it was so ordered.

Following discussion, the question was called on the motion, which carried by a vote of nine, Supervisor Mendelsohn not yet having arrived.

# CLERK'S BOARD SUMMARY REPORT OF ACTIONS OF THE FAIRFAX COUNTY BOARD OF SUPERVISORS MONDAY

June 3, 2002

#### ADDITIONAL BOARD MATTERS

#### 25. <u>UPDATE ON THE OCCOQUAN WATERSHED YEAR ACTIVITIES</u> (Tape 4)

(BACs) Chairman Hanley referred the Board to a written update on the activities approved by the Board on March 18, 2002, in celebration of the twentieth anniversary of the decision to downzone part of the Occoquan Watershed to help protect the County's water supply. Displays will be in the tents of both the Department of Planning and Zoning and the Department of Public Works and Environmental Services during this weekend's Celebrate Fairfax festival and staff is preparing an informational brochure that will be available.

Chairman Hanley said that as part of the celebration, the Board will be honoring those members of County staff, other agencies, and community members who helped make that effort possible, as well as current stewards of the watershed. This will take place at the July 22, 2002, Board meeting, the date closest to the downzoning approval of July 26, 1982. There will also be a proclamation placed in the Atrium to commemorate the event.

Chairman Hanley stated that the Board approved the formation of a New Millennium Occoquan Watershed Task Force to look at current challenges and how the water quality can continue to be maintained. She distributed a list of the following representatives who had been appointed by their respective agencies/organizations to serve on that task force:

- Department of Planning and Zoning Mr. Noel Kaplan
- Department of Public Works and Environmental Services Mr. Jeff Blackford
- Fairfax County Health Department Mr. Dennis Hill
- Fairfax County Park Authority Mr. Irish Grandfield
- Fairfax County Water Authority Ms. Jeanne M. Bailey

- Northern Virginia Regional Commission Mr. David Bulova
- Northern Virginia Soil and Water Conservation District Ms. Mary Nightlinger
- Northern Virginia Regional Park Authority Mr. Mike Riesenman
- Upper Occoquan Sewer Authority Dr. Evelyn Mahieu
- Audubon Naturalist Society (Webb Sanctuary) Mr. Cliff Fairweather
- Occoquan Watershed Coalition Dr. David Schnare
- League of Women Voters of the Fairfax Area open
- Fairfax County Federation of Citizens Associations Ms. Maya Huber
- Friends of the Occoguan Mr. Alex Vanegas
- Supervisor Sharon Bulova Ms. Jean Packard
- Supervisor Michael Frey open
- Supervisor Elaine McConnell open

Chairman Hanley relinquished the Chair to Vice-Chairman Hyland and asked unanimous consent that the Board request Mr. Al Akers of the Occoquan Watershed Coalition to chair the task force. Without objection, it was so ordered. A brief discussion ensued.

# CLERK'S BOARD SUMMARY REPORT OF ACTIONS OF THE FAIRFAX COUNTY BOARD OF SUPERVISORS MONDAY

IX. July 22, 2002

6. PROCLAMATION DESIGNATING 2002 AS "OCCOQUAN WATERSHED YEAR" IN FAIRFAX COUNTY, AND CERTIFICATES OF RECOGNITION PRESENTED TO COUNTY STAFF, COUNTY AGENCIES, COMMUNITY MEMBERS, AND CURRENT STEWARDS OF THE OCCOQUAN WATERSHED (Tapes 1-2)

Chairman Hanley relinquished the Chair to Vice-Chairman Hyland and moved approval of the Proclamation designating 2002 as "Occoquan Watershed Year" in Fairfax County. Supervisor Connolly and Supervisor Hudgins jointly seconded the motion.

Following a brief discussion, the question was called on the motion and it carried by unanimous vote.

Chairman Hanley presented Certificates of Recognition to the following County staff, County agencies, community members, and current stewards of the Occoquan Watershed on the twentieth anniversary of the decision to downzone part of the Occoquan Watershed to protect the water supply in Fairfax County:

### 1980 Occoquan Basin Study Citizens Task Force Members who supported the study:

- Maya Huber Task Force Chairman and Fairfax County Federation of Citizens Associations' representative
- Dave Russell Annandale District Representative
- Cress Malkerson Centreville District Representative
- Barbara Nunes League of Women Voters of the Fairfax Area Representative

- Jan Jeffries widow of Norm Jeffries who was Tree Commission Representative
- Nancy Brown Mason District Representative
- Ivy Mitchell Springfield District Representative
- John Bean Mount Vernon District Representative

County Organizations and their representatives at the time that served as Amici Curiae (Friends of the Court) for 1985 Court Case Upholding Board's 1985 Decision:

- Sally Ormsby President, Fairfax County Federation of Citizens Association
- Mary Nightlinger Chairman, Soil and Water Conservation District Board
- The Honorable Leslie Byrne President, League of Women Voters of the Fairfax Area
- Fred Morin Chairman, Fairfax County Water Authority Board
- Randolph Church Attorney for the Friends of the Court
- John Epling Director, Northern Virginia Planning District Commission
- The Environmental Defense Fund, Loudoun County, and VACo were also "friends of the court."

### County staff who were instrumental in the initial decision and the subsequent court case:

- Theodore Wessel (Retired)
- Steve McGregor
- Bruce Douglas (Retires this week after 24 years with the County)
- David Stroh
- Jack White

#### County's Legal Defense Team that Defended the County in the 1985 Lawsuit:

- The Honorable David Stitt
- Robert Howell
- George Symanski
- J. Patrick Taves
- Robin Baxter
- Richard Tremaine
- Sid Steele as Director of the former Office of Comprehensive Planning (now called the Department of Planning and Zoning) after the decision
- Lee Epstein of OCP (now called DPZ) who made significant contributions to the development of the legal strategy
- Audrey Moore former Board of Supervisors Chair, and Member of Board in 1982 and 1985
- Special thanks to Johanna Fitzpatrick, presiding judge for the Fairfax County Circuit Court, now Chief Judge, Virginia Court of Appeals

#### Current Stewards of the Watershed:

- Al Akers President, Occoquan Watershed Coalition
- Bill Cole Vice President
- Jim Little Secretary/Treasurer
- Eric Thiel Transportation Committee Chair
- David Schnare Chairman, Land Use and Environmental
- Cliff Fairweather Director, Audubon Naturalist Society's Webb Sanctuary, Clifton, Virginia, and its four Stream Monitor Site Leaders: Brad Hunter, Charles Smith, Jenny Salom, and Neil Sullivan

- Alex Vanegas President, Friends of the Occoquan, a stream clean-up team, Girl Scout Troop #2033, Service Unit 70-5 from Reston - Susan Funk, Leader)
- Joanna Arciszewski Northern Virginia Soil and Water Conservation District's Watershed Specialist (Deanna Crumbling and Blythe Merritt -Team Leaders)
- Rowland Shep Oliver Owner, Oliver Stables
- Ned Foster President, Friends of Little Rocky Run
- Tom Grizzard Director, Occoquan Watershed Monitoring Laboratory

### <u>Staff and related agencies that are currently involved in the Occoquan Watershed Issues:</u>

- John Wesley White Director, Department of Public Works and Environmental Services
- John Friedman, Office of Site Development Services, DPWES
- Fred Rose and the entire Stream Protection Strategy Team
- James Zook, Department of Planning and Zoning
- David Bobzien, County Attorney
- Department of Health
- Fairfax County Water Authority
- Northern Virginia Regional Commission
- Northern Virginia Soil and Water Conservation District
- Upper Occoquan Sewage Authority

Supervisor Frey noted that over the years the Western Fairfax County Citizens Association has contributed in helping to protect the Watershed in the Sully District.

Chairman Hanley noted that a representative from the Western Fairfax County Citizens Association will serve on the Task Force that has been established by the Board to look at the future of the Watershed.

Chairman Hanley recognized the presence of former Board Chairman Audrey Moore and warmly welcomed her. Mrs. Moore explained the history of the community campaign against a plan to install sewer in the Occoquan in the early 1970s and provided additional details about citizen and staff support for the 1985 court case.

Vice-Chairman Hyland returned the gavel to Chairman Hanley.

Report of the New Millennium Occoquan Watershed Task Force Final January 27, 2003

## OCCOQUAN POLICY APPENDIX C

### VIRGINIA ADMINISTRATIVE CODE CHAPTER 410 OCCOQUAN POLICY (Originally Enacted July 1, 1972)

#### 9VAC25-410-10. Introduction.

A. Purpose and authority. To provide a policy that protects the Occoquan watershed from point source pollution. The Occoquan Policy specifically regulates jurisdictional domestic sewage and sets forth requirements for high performance regional treatment plants. The policy was adopted pursuant to authority vested in the State Water Control Board (board) by §62.1-44.15 of the State Water Control Law.

B. Water quality standard. This "Occoquan Policy" also constitutes special standard "g" in the board's water quality standards for sections 7a, through 7h of the Potomac River Basin's Potomac River Subbasin (9VAC25-260-390), which sections are delineated geographically in the "Basin and Section Description" portion of the water quality standards publication (9VAC25-260-10 et seq.). In addition, the text of this policy is referred to under special standards and requirements (9VAC25-300-10), entitled "Occoquan Watershed Policy," of the water quality standards (9VAC25-260-10 et seq.).

C. Background. During the 1960s there was a great deal of concern generated about the large amount of treated sewage effluent being discharged in the Occoquan watershed, since the receiving streams feed the Occoquan reservoir, a drinking water supply for over 600,000 people in Northern Virginia.

In response to this, the board commissioned the firm of Metcalf & Eddy to study the problems of the Occoquan reservoir and to recommend a course of action to preserve the Occoquan as a valuable water resource for future generations.

The results of the Metcalf & Eddy study stated that point source pollution was the primary cause of water quality degradation in the Occoquan watershed and that a high degree of waste treatment would be necessary to prolong the life of the drinking water supply.

In 1971 the board adopted a policy for waste treatment and water quality management in the Occoquan watershed (the Occoquan Policy) which outlined a course of action to control point source pollution in the watershed.

The Occoquan Policy provided for the construction of regional high-performance treatment facilities in the watershed and a monitoring program to obtain water quality data both before and after construction of any of the high-performance plants.

The Occoquan Watershed Monitoring Program (OWMP or monitoring program) was established in 1972 which gathered an extensive amount of information and found that water quality problems in the Occoquan watershed were related directly to point source pollution and to non-point source pollution.

In 1978, a regional high-performance treatment facility (the Upper Occoquan Sewage Authority-UOSA) was placed in operation. This facility eliminated 11 major point sources of pollution in the watershed.

Shortly after UOSA began operations, costs and charges for sewage treatment in systems tributary to UOSA increased rather sharply. To date a significant part of those high costs have been associated with large amounts of infiltration and inflow being sent by the user jurisdictions to the regional facility for treatment.

In an attempt to control non-point source pollution the Commonwealth of Virginia adopted an erosion and sediment control law in 1973. In accordance with this law, all of the watershed jurisdictions have adopted

erosion and sediment control ordinances. In addition, a number of best management practices (BMP) handbooks were written and published in 1979 by the board. In mid-1980 Fairfax County adopted a BMP ordinance.

In 1978, the board contracted the firm of Camp Dresser & McKee (CDM) to reevaluate certain aspects of the Occoquan Policy. Their report was presented to the board and to the local communities in 1980 and recommended that few changes be made to the policy.

As a result of the CDM report, input from the local communities and the board's staff, an updated version of the Occoquan Policy was drafted.

#### D. References.

- 1. A Comprehensive Pollution Abatement Program for the Occoquan Watershed, Metcalf & Eddy Engineers, March 18, 1970.
- 2. Record of public hearing on March 31, 1971, concerning State Water Control Board's Occoquan Policy.
- 3. Occoquan Policy Reevaluation, Phase III Report, Camp Dresser & McKee, June 1980.
- 4. Record of public hearing on November 20, 1980, concerning amendments to the Occoquan Policy.

#### 9VAC25-410-20. Long-range policy.

- A. Number and general location of regional treatment plants.
  - 1. The number of high-performance regional plants which shall be permitted in this watershed is not more than three, but preferably two, generally located as follows:
    - a. One plant in the Fauquier County/Warrenton area.
    - b. One plant in the Manassas area to serve the surrounding area in Prince William, Fairfax, and Loudoun counties.
  - 2. All point source discharges of treated sewage effluent will preferably be located at least 20 stream miles above the Fairfax County Water Authority's raw water intake. In no case shall a plant be located less than 15 miles above the raw water intake.
  - 3. The provisions of 9VAC25-410-20 A 1 and 2 shall not limit the consideration of land disposal systems for waste treatment in the watershed, provided such systems shall have no point source discharge to state waters and shall have the approval of the State Water Control Board.
- B. Regional plant capacity allocations for the Occoguan basin.
  - 1. The initial allotment of plant capacity for the Upper Occoquan Sewage Authority treatment facility was approximately 10 MGD, based on all effluent being from high-performance plants meeting the requirements of subsections D, E and F below and all those treatment facilities belonging to the City of Manassas, the City of Manassas Park, the Greater Manassas Sanitary District, and Sanitary District 12 of Fairfax County being abandoned.
  - 2. Incremental increases in the regional plant capacity may be approved by the board based on the results of a monitoring program which shows that current and projected discharges from the high-performance plants do not create a water quality or public health problem in the reservoir. The board advises that since severe infiltration/inflow stresses the performance reliability of the regional treatment plants, jurisdictions must pursue I/I correction within their individual systems.

- C. Prerequisites for preliminary plant approval. Prerequisites before the board gives approval to preliminary plans for a regional high-performance plant are:
  - 1. A monitoring program for the receiving waters shall be in effect; and
  - 2. The authority who is to operate the proposed plant shall enter into a written and signed agreement with the board that the authority shall meet the administrative requirements of subsection F of this section.
- D. Design concept for high-performance plants on the Occoquan.
  - 1. Plant design requirements are:
    - a. The design of the high-performance sewage treatment plants discharging to the Occoquan Watershed shall meet all the requirements specified here as well as those specified in the most recent edition of the Commonwealth of Virginia Sewerage Regulations; and
    - b. The basic sewage plant design concept for the regional plants discharging to the Occoquan watershed shall be based on the Upper Occoquan Sewage Authority Wastewater Reclamation Facility.
  - 2. Changes in plant design requirements will be made according to these criteria:
    - a. Changes to the plant design described here shall only be acceptable if the change does all of the following:
      - (1) Improves or equals the plant performance and final effluent quality;
      - (2) Increases or equals plant reliability and maintainability; and
      - (3) Has a demonstrated performance in a plant of at least 5 to 10 MGD size for an operating period of not less than one, but preferably two years.
    - b. Before such changes are incorporated in the plant, specific written approval shall be obtained from the board; and
    - c. Changes to the plant design solely to reduce cost and which jeopardize plant performance and reliability will not be approved.
- E. Plant performance requirements.
  - 1. The plant performance requirements for high performance plants discharging to the Occoquan watershed are given in Table I.
  - 2. Operation of the nitrogen removal facilities is required when the ambient nitrate concentration (as N) is 5.0 mg/l or higher in the Occoquan reservoir in the vicinity of the Fairfax County Water Authority intake point. The owner of the regional sewage authority is responsible for knowing ambient results of nitrate and when operation of nitrogen removal facilities is necessary.

TABLE I.

MINIMUM EFFLUENT QUALITY REQUIREMENTS\* FOR ANY REGIONAL SEWAGE TREATMENT PLANT IN THE OCCOQUAN WATERSHED.

FINAL EFFLUENT REQUIREMENTS

COD mg/1 - 10.0

Suspended solids mg/1 - 1.0

Nitrogen mg/1 - 1.0\*\*

Phosphorus mg/1 - 0.1

MBAS mg/1 - 0.1

Turbidity NTU - 0.5\*\*\*

Coliform per 100 ml Sample - less than 2.0

- \* As measured on a monthly average unless otherwise noted. Since these are minimum requirements, the normal average would be expected to be substantially better.
- \*\* Unoxidized nitrogen (as TKN) Refer to 9VAC25-410-20 E 2 for further information.
- \*\*\* Measured immediately prior to chlorination.
- F. Administrative and technical requirements for the control of the sewer system tributary to a regional, high-performance plant in the Occoquan watershed.
  - 1. The owner to whom the permit is issued for operation of a regional plant shall meet the general and administrative requirements covered below. These requirements shall also be contractually passed on by the owner to any parties or jurisdictions with which the owner may contract for the processing of wastewater.

These requirements are applicable to regional sewage treatment plants.

- 2. The high-performance regional treatment plant shall be manned by an appropriate number of trained and qualified operating, maintenance and laboratory personnel and manned continuously 24 hours a day, seven days a week throughout the year.
- 3. The owner shall include, as part of his preliminary and final plans and specifications submitted to the board for approval, a detailed statement indicating how each of the technical and administrative requirements in this policy has been met. Any proposed deviation from any of these requirements shall be clearly identified and technically justified, and shall require formal board approval. These submittals shall also include:
  - a. Simplified fluid system diagrams which clearly identify the following:
    - (1) The average and peak capacity of each unit;
    - (2) The number of units of each type needed to handle the normal average flow and the peak of flow; and
    - (3) The number of spare units and their capacity for both average and peak flow cases shall also be identified.

In addition, a brief narrative summary description shall be submitted to identify what has been done to ensure that each unit and major subsystem can be maintained and expanded without release of effluent that does not meet the minimum standards.

- b. A simple one-line power distribution system diagram showing how outside power is brought into the plant and how power is distributed within the plant proper shall be submitted. This diagram shall also show as a minimum:
  - (1) Ratings and characteristics of electrical components such as transformers, circuit breakers, motor controllers, etc., making up the system;

- (2) Protective devices such as thermal overloads, under frequency, or under voltage relays;
- (3) Voltages supplied by all fuses;
- (4) Normal circuit breaker and switch conditions (Notes shall also be provided as required to cover abnormal, casualty, and emergency operating modes); and
- (5) How electrical loads are combined into switch gear and load center. (The use of cubicle outlines in phantom or dotted line is suggested.)
- 4. The final submittal of plans and specifications for the plant to the board shall include a systematic failure mode and effects analysis on the mechanical and electrical portions of the plant so as to demonstrate that a single failure of a mechanical or electrical component will not interrupt the plant operations which are necessary to meet the effluent requirements of Table I of this policy.
- 5. Pumping stations on the collection systems which are located in the Occoquan watershed and are tributary to a regional treatment works shall:
  - a. Have stand-by pumping units;
  - b. Have at least one "on-site" backup power supply;
  - c. Have at least one "off-site" power supply;
  - d. Be designed so that no single failure of a mechanical or electrical component could degrade pumping capability;
  - e. Have pumps and valves arranged so that these units can be removed and replaced without the by-passing of sewage;
  - f. Have flow measure devices with provisions for recording flow; and
  - g. Have retention basins of a minimum one-day capacity.
  - If these pumping stations are remote and unmanned, an alarm system shall be provided at manned stations to indicate that problems are developing and to direct maintenance assistance to the affected pumping station. The owner of each pumping station shall be required to obtain a State Water Control Board certificate.
  - A waiver may be sought from requirement g above, particularly in new collection systems exhibiting no I/I problems. However, the jurisdiction requesting such a waiver must submit documentation to the board for review that the sewer system tributary to the pump station meets the criteria established by the most recent edition of the Virginia Sewerage Regulations for infiltration/inflow, and any other such information that the board may require.
- 6. The major junctions in the collection system (e.g., at least at the 1 to 2 MGD collection points) shall have continuous recording flow measuring devices to help in the early identification of problem portions of a collection system in the event of unexplainable high flows (e.g., excessive infiltration). Also, such flow measuring devices and isolation valves shall be provided between jurisdictions as well as any others contracting for the services of the regional plant. The flow measuring devices and isolation valves between jurisdictions shall be under the control and responsibility of the owner to whom a plant certificate is issued.
- 7. Each sewage treatment plant shall have a pretreatment program approved by the board.
- 8. Waste being processed in any existing small plants shall have the first priority on treatment capacity and such capacity shall be specifically reserved for them in the new high-performance regional plants. New developments are to have second priority.

- 9. If any of the various administrative procedures of the owner of the regional treatment plant or of jurisdictions served by the plant prove ineffective under actual operating conditions, the board shall have the right to place new requirements on the owner and jurisdictions and to require any necessary action by these parties to physically correct the damage done to the reservoir due to ineffective implementation of the administrative requirements covered here.
- 10. The owner's interceptor and collection systems of the jurisdictions in the Occoquan watershed shall be designed, installed, inspected, and tested by the respective owner to limit infiltration to 100 gal/inch-dia/mile/day as a maximum. The test results shall be certified and submitted to the board.
- 11. Whenever the owner enters into an agreement with a jurisdiction for services of a regional plant, the owner shall be responsible for seeing that such jurisdictions have ordinances and rules to meet all the applicable requirements covered by this policy. These ordinances and rules shall meet the owner's approval and the owner shall monitor and spot-check to see that the jurisdictions are effectively implementing their ordinances and rules to meet the requirements covered here. The board, at its discretion, can request the owner to submit to the board for its approval the ordinances and rules that will be used to meet the board's requirements covered here.

Further, any time a user violates any of the administrative or technical requirements of the contract between the user and the owner which can affect the plant operations, hydraulic loading, or effluent quality or which affect the reservoir's water quality due to urban run-off (e.g., siltation), the owner shall not allow the user to discharge additional wastewater to the owner's plant until the problem has been resolved to the owner's satisfaction.

- 12. Up-to-date "as-built" drawings and manuals shall be available at least once a year for board inspection and review. These documents shall include as a minimum:
  - a. Up-to-date as-built electrical and fluid system diagrams;
  - b. Detailed as-built and installed drawings; and
  - c. Normal operating and casualty procedures manual. The documents shall be updated at least once a year to reflect all changes and modifications to the plant.
- 13. The design engineer shall have the responsibility of meeting the proposed effluent quality as shown in Table I. To demonstrate that the plant as designed by the engineer can meet the effluent standards, the plant is to be operated under the supervision of the design engineer for a minimum of one year of continuous operation after the "debugging" period.
- G. Other point source discharges.
  - 1. Point sources other than regional plants will be permitted as regulated or required by the Virginia Pollutant Discharge Elimination System (VPDES) permit regulation (9VAC25-30-10 et seq.).
  - 2. VPDES permits may be issued for single family homes with failing septic tanks, stormwater, pollution remediation projects, and minor industries. The permitting of major discharges (as defined in 40 CFR Part 122) other than regional sewage treatment plants is strictly prohibited with the exception of pollution remediation projects which are shown to be feasible and no other alternatives are available.
  - 3. No permit as authorized in subdivisions 1 and 2 above shall be issued or reissued unless the applicant demonstrates that it is not feasible to connect to a regional plant and that there is not a feasible alternative except to discharge.

#### 9VAC25-410-30. Expansion of existing plants in the Occoquan watershed.

A. One of the objectives of the Occoquan Policy is to reduce water quality problems in the Occoquan watershed due to pollution from point sources. To date the means of accomplishing this objective have

been the construction and utilization of a high-performance regional plant - the Upper Occoquan Sewage Authority (UOSA) - and the elimination of 11 low-performance treatment plants in favor of the UOSA facility. The 11 low-performance treatment plants constituted the major point sources of pollution in the Occoquan Watershed; however, there are a number of smaller sewage treatment facilities which are still discharging. These facilities were not connected to the regional facility for at least one of the following reasons: (i) a collector system to the regional plant was not constructed in close enough proximity to provide service, or (ii) the small facility was outside of the service area for the regional plant. At some point in the future, these remaining plants may wish to expand and increase their flows.

- B. Existing waste treatment facilities may be expanded to receive increased sewage flows; however, the degree of treatment must also be upgraded so that there will be no increase in the quantity of pollutant loadings discharged to the receiving stream. A no-discharge land-application system may be considered in lieu of upgrading a facility.
- C. Plants not meeting approved design performance limits will not be allowed additional capacity until the owner has installed additional treatment and demonstrated by means of a minimum of three months of performance data that the plant has been brought within its approved design performance levels and can accept additional waste loads without exceeding such approved design performance levels.
- D. No expansion or continued discharge shall be approved if it is feasible for the flow to be directed to a regional plant.
- E. Proposed interim expansion of plants shall be reviewed with the appropriate regional sewage authority to assure that such expansions are coordinated with the authority regional plans and can be readily incorporated into the regional system.
- F. The plans and specifications for expansion of collection and interceptor systems shall be reviewed with the appropriate regional sewage authority for its comments before they are submitted to the board and the Virginia Department of Health for approval. Any proposed expansion of collection and interceptor systems shall meet the technical and administrative requirements of 9VAC25-410-20 F, and the jurisdiction proposing such an expansion shall submit a formal letter to the board stating that its expansion will meet the requirements of 9VAC25-410-20 F.

#### 9VAC25-410-40. Occoquan Watershed Monitoring Program (OWMP).

Due to the critical nature of the receiving waters, intensive monitoring will be required to ensure that plants achieve desired performance levels at all times, and the effects of point sources and nonpoint sources on the receiving waters are measured and projected.

- 1. Watershed monitoring subcommittee.
  - a. In order to ensure that performance levels are maintained and that the effects of point sources and nonpoint sources on receiving waters are known, a watershed monitoring subcommittee shall be established and shall be convened at least once each calendar year. A subcommittee of this type must necessarily be composed of high-caliber personnel knowledgeable in the field of water and wastewater treatment and management. Accordingly, the subcommittee shall consist of two ex-officio members or their designated representatives as follows:
    - (1) Director of Virginia Department of Health's Division of Water Programs;
    - (2) Director of Virginia Department of Conservation and Recreation's Division of Soil and Water Conservation; and three other members or their designated representatives as follows:
      - (a) A representative of the Environmental Protection Agency;
      - (b) A representative of a state university in Virginia; and

- (c) A nationally recognized consultant in the water and wastewater treatment or water quality management fields.
- b. The ex-officio members shall select and submit to the board for approval the names of the other members of the subcommittee. The subcommittee shall elect a chairman.
- c. From time to time the subcommittee may seek additional expert advice.
- 2. Monitoring subcommittee's responsibilities. The watershed monitoring subcommittee shall have the following responsibilities:
  - a. To oversee that there is adequate monitoring of the regional plant effluent and process control testing at the regional plant;
  - b. To develop a water quality monitoring program for the Occoquan reservoir and its tributary streams to ensure that there is a continuous record of water quality available. To further ensure that projections are made to determine the effect of additional waste loading from point sources as well as nonpoint sources;
  - c. To ensure that the stream monitoring program is separate and distinct from plant process control testing and effluent monitoring;
  - d. To review data collected from the monitoring program and submit to the board and the various jurisdictions reports on the status of plant performance and water quality in the watershed at least once each year;
  - e. To report to the board immediately significant changes in plant performance or water quality due to either point source or non-point source pollution;
  - f. To maintain close liaison with the Fairfax County Water Authority in order to ensure satisfactory raw water which can be adequately treated at the authority's facilities; and
  - g. To establish the Occoquan Watershed Monitoring Laboratory (OWML) to conduct sampling and analyses to fulfill the above responsibilities.
- 3. Provision for restructuring of the OWMP.
  - a. The Occoquan Watershed Monitoring Program (OWMP) and the Occoquan Watershed Monitoring Laboratory (OWML) were established in accordance with the above provisions. This was done on July 1, 1972. Since that time a large body of information regarding the functioning of the Occoquan reservoir system has been accumulated. Major point sources have been consolidated into and eliminated by a high-performance sewage treatment facility (UOSA). As growth increases in the watershed, this trend is expected to continue.
  - b. The work performed by OWML has indicated that the key to water quality is a two part issue. Those parts are point source pollution and non-point source pollution. Point source discharges in the watershed are currently regulated by the board's VPDES permit program. Non-point sources of pollution are currently being addressed by state and local voluntary and mandatory control programs. However, in the future it may be necessary that additional mandatory programs be adopted.
  - c. The program shall be evaluated periodically for restructuring to account for shifts in monitoring trends and funding and any recommended restructuring approved by the board prior to implementation. The regional sewage plants are ultimately responsible for the monitoring program with the exception of the non-point source elements.

#### 4. Financing the OWMP.

- a. It is recommended that the cost of the OWMP be split equally between water supply and sewage uses. This would mean that the Fairfax County Water Authority would have to fund half of the OWMP budget while the counties of Fairfax, Prince William, Loudoun, and Fauquier and the cities of Manassas and Manassas Park would be responsible for jointly funding the other half. That portion of the OWMP budget funded by the counties and cities would be divided so that each jurisdiction would be charged in proportion to its allotted sewage capacity in the Occoquan watershed. The budget shall be reviewed by the jurisdictions prior to approval by the subcommittee.
- b. Written agreements shall be obtained from each of the jurisdictions which shall commit them to supply the above funds yearly to finance the OWMP. This monitoring program is for their protection and benefit. If for some reason a county or city does not wish to retain its sewage allotment in the Occoquan watershed or will not fund the monitoring program, then its allotment can be divided up among the remaining participating jurisdictions, with their portion of the cost of the monitoring program rising accordingly. The regional sewage plants are ultimately responsible for monitoring with the exception of non-point source elements.
- c. If federal funds and assistance can be obtained, the cost to the counties and the Fairfax County Water Authority will be reduced proportionally. The funding of the program without federal funds is to be assumed, so as not to further delay or complicate the initiation of this program.
- d. The Office of Sponsored Programs, Virginia Polytechnic Institute and State University, has agreed to be responsible for billing, receiving, and disbursement of funds to the OWMP.

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## OCCOQUAN BASIN STUDY – EXECUTIVE SUMMARY APPENDIX D

#### SUMMARY OF THE OCCOQUAN BASIN STUDY

#### A. PURPOSE AND SCOPE OF THE STUDY

The Occoquan Basin Study was conducted under a Board of Supervisors directive because of the need to protect the water quality of the Occoquan Reservoir, the source of drinking water for over 600,000 people, from excessive nonpoint pollution(I) in urban runoff(2). The study reflects concern for the threat to the public health, safety and welfare posed by nonpoint pollution.

In January 1980 the Board passed a motion, as part of the Annual Plan Review process, to initiate a study of the relationship of land use planning and water quality in the Occoquan. The specific objectives developed for the Occoquan Basin Study are as follows:

- To establish a Fairfax County water quality goal which will protect the public health, safety and welfare at the most reasonable cost.
- o To determine the effects of planned development in the study area (see Maps I and 2) on water quality.
- To determine the most appropriate long-term Noise Exposure Forecast (NEF)(3) contours and the most appropriate policies for land use and noise compatibility in the Dulles Airport Noise Impact Area.
- To determine the impact on water quality in the Occoquan if the Plan were amended to incorporate the following land use objectives:
  - To provide more utilization of the 1-66 corridor for economic development uses, particularly office use, townhouse and apartment use, as suggested in <u>Analysis of Economic Development in the 1-66 Corridor of Fairfax County, Virginia.</u>
- (1) <u>Nonpoint Source Pollution</u>: Pollution that enters a water body from diffuse origins in the watershed rather than discernible or confined conveyances, such as pipe.
- (2) <u>Urban Runoff</u>: Stormwater runoff from developed and developing areas. Urban runoff is the primary source of nonpoint pollution in the study area.
- (3) Noise Exposure Forecast (NEF): The NEF contour is a descriptor used by the Federal Aviation Administration to aid land use planning in areas impacted by airport noise. NEF is based on several factors, including, types of aircraft, mix of aircraft types in daily operation and their noise characteristics, the number of aircraft operations and the time of day they occur, utilization of runways, and flight tracks [paths] used by arriving and departing aircraft. The contour is calculated by accumulating noise exposure from single operations over a 24-hour period and weighting nighttime exposures more highly than daytime exposures. (See Appendix for full description.)

- To determine the most appropriate NEF contours and the most appropriate policies for land use and noise compatibility in the Dulles Airport Noise Impact Area.
- To achieve a land use pattern in conformance with appropriate land use and noise compatibility criteria in the Dulles Airport Noise Impact Area.
- To ascertain what Best Management Practices (BMPs)(4) are most cost-effective to implement in the study area.
- To determine a combination of land use modifications and BMPs that protect water quality and help the County achieve its land use objectives.

#### B. CITIZEN TASK FORCE PARTICIPATION

The Board of Supervisors established a citizen's task force comprised of representatives from all major citizen's interest groups as well as each Supervisor District to work with the Office of Comprehensive Planning as it conducted the Occoquan Basin Study.

The task force met more than twenty times to consider the issues, facts and conditions that are pertinent to the study and developed in-depth responses to staff work during all phases of the study process. Several of the task force members were also members of the Route 50/I-66 study area task force because the Route 50/I-66 Study area is partially within the Occoquan Basin Study area. Many planning issues pertain to both study areas. The task force chairperson was Maya Huber of the Federation of Citizens' Associations. Task force recommendations on the Occoquan Basin Study and a listing of task force members appear in Appendix B.

#### C. SUMMARY OF THE OCCOQUAN BASIN STUDY METHODOLOGY

The Occoquan Basin Study was undertaken according to the following steps:

#### Step I: Defining the water quality problem

Accelerated eutrophication was determined to be the principal water quality concern. This term describes the premature aging of a water body caused by urban and agricultural activities in the watershed. Characteristics include excessive growth of algae, taste and odor problems, fish kills, and higher water treatment costs. Occoquan water quality problems are a health, safety and welfare concern because the Reservoir is the source of drinking water for over 600,000 Northern Virginians.

The local governments that depend on the Occoquan Reservoir and the State Water Control Board (SWCB) have been actively concerned about

<sup>(4) &</sup>lt;u>Best Management Practice</u> (BMP): An activity or physical entity that is used to prevent or reduce the amount of pollution generated by nonpoint sources, e.g., clustered development, infiltration trenches, detention ponds, porous pavement, vacuum sweeping of streets and parking lots, lawn fertilization management.

the eutrophication problem since the late 1960's. In 1971, the SWCB promulgated the "Occoquan Policy." This document, which found that phosphorus from inadequately treated sewage was the principal cause of eutrophication, required that the eleven secondary sewage treatment plants operating in the Cub Run subshed of the Occoquan watershed be replaced by a regional advanced wastewater treatment (AWT) plant, designed to remove 99 percent of the phosphorus from sewage. This plant, the Upper Occoquan Sewage Authority AWT, (UOSA), began phosphorus removal in August 1978 following the expenditure of \$82 million in construction costs.

An additional requirement of the Occoquan Policy was the establishment of the Occoquan Watershed Monitoring Laboratory (OWML) to monitor water quality in the reservoir and its major tributaries, and to assess the performance of UOSA plant.

The OWML found that during the 1970's, water quality continued to decline. Critical indicator values of water quality such as a phosphorus concentration of .050 mg/1 and chlorophyll  $\underline{a}$  concentration of 25 ug/1 were regularly exceeded(5). The decline occurred despite improvements in sewage treatment at the 11 secondary sewage treatment plants.

In the mid and late 1970's, the OWML and the Northern Virginia Planning District Commission (NVPDC) conducted field studies that found that nonpoint source pollution was also an important contributor to eutrophication and that urban land uses would account for a majority share of the phosphorus loadings to the reservoir in the future.

#### Step 2. Development of water quality modeling techniques

Two models were used to calculate the impact of various combinations of land uses and BMPs on water quality. The NVPDC's Occoquan Basin Computer Model uses a series of engineering equations to simulate the hydrologic processes of the watershed. Model simulations include calculations of phosphorus runoff, delivery of phosphorus to the reservoir and reservoir water quality response to the phosphorus loadings. Based on the land use-runoff pollution relationships monitored by NVPDC and used for input in the Occoquan Basin Computer Model, the Office of Comprehensive Planning developed a desk-top model(6). Tests of identical land use BMP combinations produced similar results with both models, allowing the use of the desk-top model in this study.

<sup>(5)</sup> Chlorophyll <u>a</u>: A particular type of chlorophyll which is produced by algae. The concentration of chlorophyll <u>a</u> is directly related to the amount of algae and is a widely used indicator of the degree of eutrophication in a water body.

<sup>(6) &</sup>lt;u>Desk-top Model:</u> A series of mathematical equations which have been encoded for use on a programmable calculator, describing land use runoff pollution relationships and the estimated reduction in runoff pollution attributed to BMPs.

#### Step 3. Selection of a water quality goal

Selection of a water quality goal included assessments of the following:

- a. data sources for indicators of water quality that are available and acceptable for general planning purposes.
- b. the projected impact of future urban development on water quality.
- c. the impact of water pollution control methods on the other planning objectives established for the study area.
- d. the distribution of the pollutant load between the several Occoquan watershed jurisdictions.

This analysis assumed that pollutant indicator values in excess of .05 mg/1 phosphorus and 25 ug/1 chlorophyll <u>a</u> are indicative of highly eutrophic waters. OWML measurements reveal that these upper limit values are frequently exceeded.

Model simulations suggested that phosphorus loadings and other undesirable pollutants such as heavy metals and biological oxygen demand (BOD)(7) will increase as new development takes place, unless corrective action is taken.

Water quality in the Occoquan has reached a state of deterioration which requires prompt control of accelerated eutrophication. For this reason the principal goal of this study is to describe reasonable means for preventing further deterioration of Occoquan water quality resulting from urban and agricultural activities within Fairfax County. This goal implies that a water pollution control strategy sufficient to limit runoff pollution to levels comparable to those generated by existing and committed development will be proposed.

The study area was estimated to be the source of about 17 percent of the existing phosphorus loadings. Most of the future loadings from the study area would result from urban development. However, much of the phosphorus generated by the other Occoquan watershed counties, Fauquier, Prince William and Loudoun, is from agricultural land uses. The other jurisdictions can achieve reductions in existing loadings by implementing BMPs on existing agricultural uses. Fairfax County has very little agriculture, so Fairfax County's runoff pollution control effort must focus on reducing projected increases in runoff pollution from future urban development in the 100-square-mile study area. A program to improve water quality in the 584-square mile Occoquan watershed will probably require reductions in pollution from both existing uses, especially agriculture, and new urban land uses.

<sup>(7) &</sup>lt;u>Biological Oxygen Demand</u>, (BOD), describes the impact of organic substances that consume oxygen as they decompose. If BOD is too high, dissolved oxygen becomes depleted. Fish kills, discoloration and odor problems may result.

### <u>Step 4.</u> <u>Analysis of water quality control techniques and formulation of BMP Test Alternatives</u>

The phosphorus reduction potential of structural BMPs, nonstructural BMPs, and land use, which are described as follows, were assessed.

- a. Detention Basin Controls which are similar to stormwater management ponds were estimated to remove 30-35 percent of the phosphorus in runoff at an estimated cost of \$60 per pound based on the incremental capital cost of the BMP portion of the basin.
- b. Volume Controls include infiltration trenches and pits, dutch drains and porous pavements. These structures are estimated to remove 50 to 65 percent of the phosphorus in runoff.
  - Infiltration structures designed to meet the County's detention requirement also act as BMPs without any modification or additional cost.
- c. Source Controls include all the BMPs that prevent phosphorus from entering stormwater runoff. Source controls include cluster development, reduced street widths, vacuum street and parking lot sweeping, and public education for better lawn and garden fertilization management. Efficiencies and costs vary.
- d. Land use can also be a BMP. Because pollutant loadings vary between different land uses, the land use plan is a major determinant in the amount of projected runoff pollution.

Three BMP Test Alternatives were developed to assess the effectiveness of BMPs in meeting the water quality goal:

- (1) BMP Test Alternative 1 included only the stormwater management BMPs currently required by the <u>Public Facilities Manual</u>.
- (2) BMP Test Alternative 2 adds clustering and some parking lot sweeping to the stormwater management BMPs of Test Alternative 1.
- (3) BMP Test Alternative 3 adds a comprehensive BMP retrofit to areas of existing development in addition to the stormwater management BMPs of Test Alternative 1.

#### Step 5. Analysis of other Planning Objectives and Formulation of Land Use Test Alternatives

Other major planning goals relevant to the Occoquan Basin Study besides water quality include 1) maximum utilization of suitable sites for economic development, 2) a planned land use pattern that is in conformance with appropriate land use and noise compatibility policies for the Dulles Airport Noise Impact Area and 3) compatible area planning with existing communities.

The economic development goal is based on recommendations in the I-66 Study (1980) which suggest that several sites in the I-66 corridor totaling around 2,000 acres have a potential for economic development, especially office use, to take advantage of the access to the regional highway network. In addition, it was suggested that medium and high density residential use should be planned in the same location to help reduce transportation needs to employment or to facilitate work trips to the downtown and beltway employment sites.

The Plan was amended in 1979 to incorporate interim policies for recognition of aircraft noise impacts in the vicinity of Dulles Airport. The Dulles Airport Noise Impact Area was expanded so that it would coincide with post-1995 noise contours (30 and above NEF) that had recently been projected by FAA as part of their revision of the Dulles Airport Master Plan. At the same time the new contours were incorporated into the Plan, the Board of Supervisors established interim noise/land use compatibility policies to guide the planning and zoning of land uses within the Noise Impact Area. These policies were evaluated and developed under the DANIS, (Dulles Airport Noise Impact Study), Phase I, project. Phase II, a comprehensive reevaluation of land use in the Dulles Airport Noise Impact Area and an examination of the appropriateness of the Phase I policies of DANIS, has been incorporated into the Occoquan Basin Study. Phase III of DANIS, exploration of implementation mechanisms for land use and noise compatibility policies has also been incorporated in the Occoquan Basin Study. This evaluation involved examination of scientific research to ascertain the health impacts of noise and the best methods for determining noise and land use compatibility criteria. The basis for the Federal Aviation Administration's delineation of the expanded noise contours was also examined, as were the County's current land use policies in the projected Noise Impact Area.

#### Step 6. Formulation and Testing of Land Use Test Alternatives

Five Land Use Test Alternatives were developed to determine the impact of land use on the water quality goal, and how best to achieve other planning objectives as well as the water quality goal. The first three Land Use Test Alternatives are designed to assess the impact of the Plan, a development pattern that would result under current zoning and a combination of the two.

#### (a) Land Use Test Alternatives A, B, and C.

- Land Use Test Alternative A was designed to test the impact of development if it occurs in conformance with the Plan.
- Land Use Test Alternative B was designed to show the impact of development as it would occur under the Plan, except in the areas where existing zoning (R1) is a higher density than the Plan, in which case existing zoning is used.
- Land Use Test Alternative C assumes that all future development occurs under existing zoning districts.

Water quality testing indicated that Comprehensive Plan recommended land uses (Land Use Test Alternative A) could come close to meeting the water quality goal if implemented in combination with a comprehensive program of BMPs as effective as BMP Test Alternative 3. Land Use Test Alternatives B and C both fail to meet the water quality goal by substantial margins.

Analysis of the water quality impacts of the land use goals and their role in these three Test Alternatives indicates that most or all of the Plan population can be accommodated while still meeting the water quality goal.

#### (b) Land Use Test Alternatives D and E

Two additional Land Use Test Alternatives were designed to "bracket" a range of development outcomes: One emphasizes new development, the other minimizes growth potential. Land Use Test Alternative D reflects a high level of projected economic and housing development. Test Alternative E was designed to determine how much the Alternative D level of economic and housing development would have to be reduced to meet the water quality goal under existing BMP requirements.

Water Quality testing of Test Alternative D determined that the water quality goal and the high level of economic and housing development could not both be fully achieved. However, the test results were comparable to those for Test Alternative A (the Comprehensive Plan) exceeding the water quality goal by a moderate amount when BMP Test Alternative 3 is applied. In fact, both Test Alternative A and Test Alternative D are reasonably close to achieving the water quality goal.

For assessing the impact of land uses that are compatible with noise in the Dulles Airport Noise Impact Area, several types of land uses were considered: industry (including office), agriculture, forestry and non-urban(8) residential uses. Each use has a different impact on the water quality goal as well as on the other planning objectives.

Water quality testing indicates that the impact of exchanging economic development uses for residential uses makes little difference in the impact on water quality.

#### D. SUMMARY OF STUDY FINDINGS

A number of findings emerge from the process of evaluating five Land Use Test Alternatives and three BMP Test Alternatives in combination to determine the most reasonable way to meet the water quality goal and fulfill other planning objectives for the study area. These are summarized as follows:

<sup>(8)</sup> Non-Urban land uses include park land, open space and residential use at a maximum density of .2 dwellings per acre.

### GOAL #1: To assure no further degradation of the Occoquan Reservoir water quality beyond that level projected for existing and committed use.

#### Findings related to Goal #1

- Current water quality problems include accelerated eutrophication, the accumulation
  of heavy metals in the aquatic environment, periodic low dissolved oxygen levels and
  other water quality problems resulting from excessive nonpoint pollution.
- The documentation of the water quality problems in the Occoquan Reservoir has been provided by CH2M Hill and Camp, Dresser and McKee consultants for the State Water Control Board, monitoring and modeling work performed for the Metropolitan Washington Council of Government's "208" Water Quality Plan and the Occoquan Basin Nonpoint Pollution Management Program by NVPDC, and several years of water quality monitoring carried out by the Occoquan Watershed Monitoring Laboratory.
- The desk-top nonpoint pollution generation model developed by the Office of Comprehensive Planning which was used in conjunction with NVPDC's Occoquan Basin Computer Model can produce simulations of the present and future water quality impacts of different land use and BMP test alternatives which are adequate for land use and water quality planning purposes.
- Simulated concentrations of such eutrophication indicators as phosphorus and chlorophyll <u>a</u> are appropriate for in-house assessments of progress toward achieving a non-degradation water quality goal.
- For general water quality planning purposes in the near future, a simulated average algal growing season chlorophyll <u>a</u> concentration of 24.3 mg/1 and a study area loading of 25,000 lbs. total phosphorus during a year of average wetness can serve as indicators for measuring progress toward achieving the non-degradation goal. These have been used in calculations performed with the desk-top model.
- The land uses shown in the Plan for the study area can come close but cannot achieve the non-degradation goal with any cost-effective package of BMPs that can be identified at the present time.
- The current BMP requirements are sufficient to meet the water quality goal only if new development is severely limited, which would mean severely curtailing established economic development and housing goals.
- The most effective land use BMP is non-urban development. Land use test alternatives that do not have extensive areas of nonurban land use did poorly in water quality model simulations.

- If effective BMPs are applied to high intensity land uses in order to take advantage of economies of scale, differences in nonpoint source pollution impacts between most urban land uses will be small.
- In order to meet the water quality goal, about two-thirds of the Occoquan Basin study area must be in non-urban land uses, and a more intense BMP program must be implemented in the urban envelope(9).

GOAL #2 To achieve maximum utilization of sites suitable for economic development.

#### Findings related to Goal #2

 It is possible to increase planned industrial use south of Dulles Airport and incorporate into the Plan all but one of the potential economic development areas identified in the Analysis of Economic Development Potential in the I-66 Corridor of Fairfax County, Virginia.

GOAL #3: To determine the most appropriate NEF contours and the most appropriate policies for land use and noise compatibility in the Dulles Airport Noise Impact Area.

#### Findings related to Goal #3

Through an evaluation of the most current scientific research and noise/land use compatibility policies it has been concluded that the post-1995 NEF contours and the Plan policies for land use and noise compatibility (both adopted in 1979 on an interim basis) are the best available information and appropriate for planning purposes in the Dulles Airport Noise Impact Area.

GOAL #4: To achieve a land use pattern in conformance with the appropriate NEF contours and land use and noise compatibility policies.

#### Findings related to Goal #4

The Plan can be amended so that land uses in the projected Dulles Noise Impact
Area can be in conformance with appropriate policies for land use and noise
compatibility.

#### OTHER STUDY FINDINGS:

The most effective method to preserve environmentally sensitive lands, related to stream valleys, floodplains, and steep slopes, is to implement Plan policy for the designation of Environmental Quality Corridors (EQCs) and reflect them on the Plan map.

<sup>(9) &</sup>lt;u>The urban envelope</u> contains commercial, industrial and office uses and residential use at a minimum density of .5 dwellings per acre.

A land use option with a buildout population comparable to that of the Plan can be designed for the Occoquan Basin Study area without violating the water quality goal. This can be accomplished if (a) the urban envelope is slightly reduced, (b) a greater proportion of high density residential use is planned, (c) non-urban land increased slightly and (d) additional BMP requirements are implemented.

#### **GENERAL CONCLUSION**

It is possible to modify the Comprehensive Plan for the Occoquan Basin study area so that an acceptable water quality goal can be met while the County continues to pursue and realize a variety of other planning and development objectives. This can be done if about two-thirds of the land in the Occoquan Basin study area is rezoned to a residential density of .2 du/ac to insure that the area remains in non-urban uses. It is also necessary for the BMP program to be strengthened to substantially reduce projected rates of runoff pollution from urban areas.

#### E. <u>RECOMMENDATIONS</u>

The recommendations enumerated below are made as a result of the study analysis and findings presented in Chapters III and IV. The recommendations are designed to work in combination to achieve the water quality goal while permitting the County to actively pursue its other planning objectives.

#### 1. The Water Quality Goal

#### Recommendation:

The water quality of the Occoquan Reservoir should be protected in the interest of the public health, safety and welfare by amending County policies and ordinance regulations where necessary to assure that there is no degradation of the Occoquan water quality resulting from urbanization and agricultural activity in Fairfax County, beyond the level projected for existing and committed development as identified in the Occoquan Basin Study. In order to insure that adequate water quality data continues to be available, the County should support continued independent monitoring of Occoquan water quality. This position should be stated as a water quality goal of Fairfax County.

#### 2. A Mechanism to Update the Best Management Practices BMP Requirement

#### Recommendation:

It is recommended that the Board of Supervisors establish a multiagency Occoquan Nonpoint Pollution Control Committee composed of representatives from the Office of Comprehensive Planning, Department of Environmental Management, and Department of Public Works which will define a coordinated program identifying and recommending for implementation the additional BMPs necessary to achieve the water quality goal set forth in this study.

#### 3. Land Use Revisions

#### Recommendation:

The Plan should be amended to incorporate the Occoquan Basin Study Recommended Land Use Plan (See Map 16), the major aspects of which are summarized as follows:

- Approximately two-thirds of the Occoquan Basin study area, including the areas west of Cub Run, south of Centreville (see Map 16) and most of the Popes Head Creek watershed, should be planned for non-urban use (including, park, EQCs, open space and low-density residential use) not to exceed a density of .2 du/ac (5-acre lots). Agriculture uses, with BMP applications sufficient to create pollutant loading factors comparable to residential use at a maximum density of .2 du/ac may be considered as an acceptable alternative.
- Land in the Chantilly Route 50 environs between the Route 50/I-66 study area,
   Centreville, the Dulles Airport Noise Impact Area and Difficult Run should remain essentially as shown on the Plan. (See Map 16.)
- Centreville should be the subject of a detailed land use and urban design study to ascertain final land use, transportation, public facilities, environmental and zoning policies (see Map 17).
- Interim land use policies should be adopted for Centreville before a detailed plan is completed so that there is a uniform basis for making land use decisions that cannot be deferred (see Chapter V, Centreville Mixed Land Use Area narrative).
- Incorporate in the Plan most of the sites recommended by the <u>Analysis of Economic Development Potential in the I-66 Corridor of Fairfax County, Virginia for office use to take advantage of the access to the regional highway network. (See Maps 16 and 17 and Tables 29 and 33)(10).
  </u>
- Planned land uses in the projected Dulles Airport Noise Impact Area should be modified to be in conformance with the noise contours (post-1995 30 NEF and above) and the land use and noise compatibility policies (see Recommendation #5 and Map 16).
- The land use Plan map should include Environmental Quality Corridor areas identified according to current policy. (See Map 6.)

<sup>(10)</sup> In the proposed Occoquan Basin Study Land Use Plan land use recommendations for the Route 50/I-66 Squality testing results can be complete and basin-wide comparisons can be made.

 The land adjacent to the Upper Cub Run in the vicinity of Route 50 should be investigated to determine if pre-historical archaeological sites should be included either in the EQC system or a historic district for archaeological preservation. (See Map 10.)

#### 4. Comprehensive Changes in Zoning

Several recommendations are made for amendments to the Zoning Ordinance in order to prevent further degradation of the drinking water reservoir which serves over 600,000 people. These changes are designed to protect the public health, safety and welfare. The recommendations, if adopted, will implement key objectives of the Comprehensive Plan and the proposed Occoquan Basin Study Land Use Plan, and provide for the coordinated, harmonious development of land.

#### Recommendation:

Comprehensively rezone all land in the study area which is designated non-urban in the proposed Occoquan Basin Study Land Use Plan to the RC (Residential-Conservation) Zoning District.

#### Recommendation:

Two actions affecting the RC (Residential-Conservation) Zoning District are recommended:

- 1. Consider modifications to the RC district to allow cluster development by special exception.
- 2. Amend the minimum yard requirements of the present RC district to make them the same as the R1 district minimum yard requirements.

#### Recommendation:

Enact within the Zoning Ordinance one or several Public Water Supply Reservoir Watershed Protection District(s). Adoption of this recommendation would result either in the creation of a single zoning district which would be applied in combination with each of the current zoning districts in the study area or in the creation of a series of new zoning districts which would replace the existing zoning districts but would be similar to the replaced zoning districts in many ways. In either case, the district(s) will be designed to allow for the coordinated harmonious development of land and the protection of the water supply reservoir.

#### Recommendation:

Amend the Zoning Ordinance to bring the Airport Noise Impact Overlay District into conformance with the Comprehensive Plan by amending this district to base district boundaries on the post-1995 NEF contours, and by amending the acoustical performance standards to be the same as the standards listed in the Plan. In addition, amend the Zoning Map to implement this district.

#### Recommendation:

Consider comprehensively rezoning all land in the study area currently zoned residential and planned non-residential which is within the adopted post-1995 35+ NEF contours to low-intensity non-residential zoning districts as recommended in the proposed Occoquan Basin Study Land Use Plan.

#### 5. The Dulles Airport Noise Impact Area

#### Recommendation:

- The Projected Dulles Airport noise impact contours (post-1995 NEF 30 and above), are the best available information for preliminary purposes and should be retained in the Plan.
- Policies contained in the Plan for land use and noise compatibility in the Dulles Airport Noise Impact Area are appropriate and should be designated as the policies of the Plan rather than as interim policies.
- Amend the Land Use Plan and Plan map to reflect noise-compatibility policies in the Dulles Airport Noise Impact Area according to the Occoquan Basin Study recommended land use plan map. (See Map 16.) (See Recommendation #3.)

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# R-C DISTRICT AND WATER SUPPLY PROTECTION OVERLAY DISTRICT APPENDIX E

# ZONING ORDINANCE ARTICLE 3 RESIDENTIAL DISTRICT REGULATIONS PART C 3-C00 R-C RESIDENTIAL-CONSERVATION DISTRICT

#### 3-C01 Purpose and Intent

The R-C District is established to protect water courses, stream valleys, marshes, forest cover in watersheds, aquifer recharge areas, rare ecological areas, and areas of natural scenic vistas; to minimize impervious surface and to protect the quality of water in public water supply watersheds; to promote open, rural areas for the growing of crops, pasturage, horticulture, dairying, floriculture, the raising of poultry and livestock, and for low density residential uses; and otherwise to implement the stated purpose and intent of this Ordinance.

#### 3-C02 Permitted Uses

- 1. Accessory uses and home occupations as permitted by Article 10.
- 2. Agriculture, as defined in Article 20.
- 3. Dwellings, single family detached.
- 4. Privately-owned dwellings for seasonal occupancy, not designed or used for permanent occupancy, such as summer homes and cottages, hunting and fishing lodges and cabins.
- 5. Public uses.

#### 3-C03 Special Permit Uses

For specific Group uses, regulations and standards, refer to Article 8.

- 1. Group 3 Institutional Uses, limited to:
  - A. Churches, chapels, temples, synagogues, and other such places of worship
  - B. Churches, chapels, temples, synagogues and other such places of worship with a nursery school or private school of general education
  - C. Home child care facilities
- 2. Group 4 Community Uses.
- 3. Group 6 Outdoor Recreation Uses, limited to:
  - A. Camp or recreation grounds
  - B. Riding and boarding stables
  - C. Skeet and trapshooting ranges
  - D. Veterinary hospitals, but only ancillary to kennels, riding or boarding stables
- 4. Group 7 Older Structures, limited to:
  - A. Restaurants
  - B. Summer theatres

- 5. Group 8 Temporary Uses, limited to:
  - A. Carnival, circus, festival, fair, horse show, dog show, steeplechase, music festival, turkey shoot, sale of Christmas trees or other seasonal commodities and other similar activities
  - B. Construction material yards accessory to a construction project
  - C. Contractors' offices and equipment sheds to include trailers accessory and adjacent to an active construction project
  - D. Subdivision and apartment sales and rental offices
  - E. Temporary dwellings or mobile homes
  - F. Temporary farmers' markets
  - G. Temporary mobile and land based telecommunication testing facility
- 6. Group 9 Uses Requiring Special Regulation, limited to:
  - A. Home professional offices
  - B. Veterinary hospitals
  - C. Modification to minimum yard requirements
  - D. Accessory dwelling units

#### 3-C04 Special Exception Uses

For specific Category uses, regulations and standards, refer to Article 9.

- 1. Category 1 Light Public Utility Uses.
- 2. Category 2 Heavy Public Utility Uses, limited to:
  - A. Regional sewage treatment and disposal facilities
- 3. Category 3 Quasi-Public Uses, limited to:
  - A. Alternate uses of public facilities
  - B. Churches, chapels, temples, synagogues and other such places of worship with a nursery school or private school of general education
  - C. Cultural centers, museums and similar facilities
  - D. Dormitories, fraternity/sorority houses, rooming/boarding houses, or other residence halls
  - E. Institutions providing housing and general care for the indigent, orphans and the like
  - F. Nursery schools
  - G. Private clubs
  - H. Private schools of general education
  - I. Quasi-public parks, playgrounds, athletic fields and related facilities
- 4. Category 5 Commercial and Industrial Uses of Special Impact, limited to:
  - A. Bed and breakfasts
  - B. Golf courses, country clubs
  - C. Golf driving ranges
  - D. Kennels, animal shelters
  - E. Marinas, docks and boating facilities, commercial

- F. Offices
- G. Plant nurseries
- H. Veterinary hospitals, but only ancillary to kennels

#### 3-C05 Use Limitations

- 1. No sale of goods or products shall be permitted, except as accessory and incidental to a permitted, special permit or special exception use.
- 2. All uses shall comply with the performance standards set forth in Article 14.
- 3. Cluster subdivisions may be permitted in accordance with the provisions of Sect. 9-615.

#### 3-C06 Lot Size Requirements

- 1. Minimum district size for cluster subdivisions: 10 acres
- 2. Minimum lot area
  - A. Conventional subdivision lot: 5 acres
  - B. Cluster subdivision lot: 36,000 sq. ft.
- 3. Minimum lot width
  - A. Conventional subdivision lot: 200 feet
  - B. Cluster subdivision lot:
    - (1) Lot adjacent to a major thoroughfare:
      - (a) Interior lot 200 feet
      - (b) Corner lot 200 feet
    - (2) Lot adjacent to a local or collector street:
      - (a) Interior lot No Requirement
      - (b) Corner lot 125 feet

#### 3-C07 Bulk Regulations

- 1. Maximum building height
  - A. Single family dwellings: 35 feet
  - B. All other structures: 60 feet
- 2. Minimum yard requirements
  - A. Single family dwellings
    - (1) Front yard: 40 feet
    - (2) Side yard: 20 feet
    - (3) Rear yard: 25 feet
  - B. All other structures
    - (1) Front yard: Controlled by a 50 dg angle of bulk plane, but not less than 40 feet
    - (2) Side yard: Controlled by a 45 dg angle of bulk plane, but not less than 20 feet

- (3) Rear yard: Controlled by a 45 dg angle of bulk plane, but not less than 25 feet
- 3. Maximum floor area ratio:
  - A. 0.10 for uses other than residential or public
  - B. 0.15 for public uses

#### 3-C08 Maximum Density

One (1) dwelling unit per five (5) acres, or 0.2 dwelling units per acre

#### 3-C09 Open Space

In subdivision approved for cluster development, 50% of the gross area shall be open space

#### 3-C10 Additional Regulations

- 1. Refer to Article 2, General Regulations, for provisions which may qualify or supplement the regulations presented above.
- 2. Refer to Article 11 for off-street parking, loading and private street requirements.
- 3. Refer to Article 12 for regulations on signs.
- 4. Refer to Article 13 for landscaping and screening requirements.
- 5. Refer to Article 17 for uses and developments which are subject to site plan provisions.

# ZONING ORDINANCE ARTICLE 7 OVERLAY AND COMMERCIAL REVITALIZATION DISTRICT REGULATIONS PART 8 7-800 WATER SUPPLY PROTECTION OVERLAY DISTRICT

#### 7-801 Purpose and Intent

Water Supply Protection Overlay Districts are created for the purpose of promoting the public health, safety, and welfare through the protection of public water supplies from the danger of water pollution. Regulations within such districts are established to prevent water quality degradation due to pollutant loadings within the watersheds of public water supply reservoirs. This district shall be in addition to and shall overlay all other zoning districts where it is applied, so that any parcel of land lying in such an overlay district shall lie in one or more of the other zoning districts provided for by this Ordinance. The effect is to create a new district which has the characteristics and limitations of the underlying district, together with the characteristics and limitations of the overlying district.

Regulations within such an overlay district are intended to provide a means for specific review and approval of residential, commercial, industrial and other development proposals that may have adverse water quality impacts; to encourage land uses and activities which will be compatible with water quality protection; and to assure that structures and uses within such overlay districts will be developed in a manner that will serve the health, safety and welfare objectives of preserving the environmental integrity of public water supply reservoirs.

#### 7-802 District Boundaries

Water Supply Protection Overlay District boundaries shall be established on the Official Zoning Map, and shall be drawn so as to include lands draining into a water supply reservoir.

#### 7-803 Establishment of Districts

Water Supply Protection Overlay Districts shall be established in the same manner as any other zoning district permitted by this Ordinance, and may be amended in accordance with the provisions of Part 2 of Article 18.

#### 7-804 Administration

- 1. The Director shall be responsible for reviewing all proposed uses to determine if the property to be developed and/or used is located in the overlay district.
- 2. If any proposed use is so located, then such use shall be subject, as applicable, to the provisions of Sect. 808 below.

#### 7-805 Permitted Uses

All uses permitted by right in the underlying zoning district(s)

#### 7-806 Special Permit Uses

All uses permitted by special permit in the underlying zoning district(s)

#### 7-807 Special Exception Uses

All uses permitted by special exception in the underlying zoning district(s)

#### 7-808 Use Limitations

In addition to the use limitations presented in the underlying zoning district(s), the following use limitations shall apply:

- 1. Any subdivision which is subject to the provisions of Chapter 101 of The Code or any use requiring the approval of a site plan in accordance with the provisions of Article 17 shall provide water quality control measures designed to reduce by one-half the projected phosphorus runoff pollution for the proposed use. Such water quality control measures or Best Management Practices (BMPs) shall be reviewed, modified, waived and/or approved by the Director in accordance with the Public Facilities Manual. In no instance shall the requirement for BMPs be modified or waived except where existing site characteristics make the provision impractical or unreasonable on-site and an alternative provision is not or cannot be accommodated off-site, and where it can be established that the modification or waiver will not affect the achievement of the water quality goals for the public water supply watershed as set forth in the adopted comprehensive plan.
- 2. Any establishment for warehousing, production, processing, assembly, manufacture, compounding, preparation, cleaning, servicing, testing, or repair of materials, goods or products which generates, utilizes, stores, treats, and/or disposes of a hazardous or toxic material or waste, as set forth in Title 40, Code of Federal Regulations, Parts 116.4 and 261.30 et seq., shall submit the following information with any application for a proposed development or use unless deemed unnecessary by the Director:

- A. A listing of all toxic and hazardous materials and wastes that will be generated, utilized, stored, treated, and/or disposed of on site:
- B. A soils report describing the nature and characteristics of the soils covering the site;
- C. A description of surface and groundwater characteristics of the site and the surrounding area within 300 feet of site boundaries:
- D. A description of all spill prevention, containment, and leakage control measures proposed by the applicant, for all toxic and hazardous materials and wastes generated, utilized, stored, treated, and/or disposed of on the site.
- 3. Such information shall be referred to the Department of Public Works and Environmental Services for review in accordance with the provisions of Chapter 67 of The Code and other applicable laws and ordinances. When deemed appropriate, the Director of the Department of Public Works and Environmental Services may furnish a copy of the application and information to the Virginia Department of Environmental Quality and other appropriate agencies.

#### 7-809 Lot Size Requirements

As specified in the underlying zoning district(s)

#### 7-810 Bulk Regulations

As specified in the underlying zoning district(s)

#### 7-811 Open Space

As specified in the underlying zoning district(s)

#### 7-812 Additional Regulations

As specified in the underlying zoning district(s)

## LIST OF ACRONYMS AND TERMS APPENDIX F

**2232 REVIEW PROCESS:** A public hearing process pursuant to Sect. 15.2-2232 (formerly Sect. 15.1-456) of the Virginia Code that is used to determine if a proposed public facility not shown on the adopted Comprehensive Plan is in substantial accord with the plan. Specifically, this process is used to determine if the general or approximate location, character and extent of a proposed facility is in substantial accord with the Plan.

**BENTHICS:** Benthics, short for benthic macroinvertebrates, are organisms living in, or on, bottom substrates of aquatic ecosystems.

**BG:** Billion Gallons.

**BMP:** Best Management Practice. Stormwater management techniques or land use practices that are determined to be the most effective, practicable means of preventing and/or reducing the amount of pollution generated by nonpoint sources in order to improve water quality.

**BZA:** Board of Zoning Appeals.

**CLUSTER DEVELOPMENT:** Residential development in which the lots are clustered on a portion of a site so that significant environmental/historical/cultural resources may be preserved or recreational amenities provided. While smaller lot sizes are permitted in a cluster subdivision to preserve open space, the overall density cannot exceed that permitted in the zoning district if the site were developed as a conventional subdivision.

**CBPO:** Chesapeake Bay Preservation Ordinance (Chapter 118 of the Fairfax County Code). Regulations that the State has mandated must be adopted to protect the Chesapeake Bay and its tributaries. These regulations must be incorporated into the comprehensive plans, zoning ordinances and subdivision ordinances of the affected localities. Refer to Chesapeake Bay Preservation Act, Va. Code Section 10.1-2100 et seq and VR 173-02-01, Chesapeake Bay Preservation Area Designation and Management Regulations.

**CHLOROPHYLL:** Green pigment in plants that transforms light energy into chemical energy in photosynthesis.

CWA: Center for Watershed Protection.

**CYNOBACTERIA:** Bluegreen algae; phylum or organisms that are biochemically bacterial in nature but perform plant photosynthesis.

**DEQ:** Virginia Department of Environmental Quality.

**DO:** Dissolved Oxygen. The concentration of free (not chemically combined) molecular oxygen (a gas) dissolved in water, usually expressed in milligrams per liter, parts per million, or percent of saturation. Adequate concentrations of dissolved oxygen are necessary for the life of fish and other aquatic organisms and the prevention of offensive odors. DO levels are considered the most important and commonly employed measurement of water quality and indicator of a water

body's ability to support desirable aquatic life. Levels above 5 milligrams per liter (mg  $O_2/L$ ) are considered optimal.

**DPWES:** Fairfax County Department of Public Works and Environmental Services.

**DPZ:** Department of Planning and Zoning.

**DU/AC:** Dwelling Units Per Acre.

**EQC:** Environmental Quality Corridor. An open space system designed to link and preserve natural resource areas, provide passive recreation, and protect wildlife habitat. The system includes stream valleys, steep slopes and wetlands. For a complete definition of EQCs, refer to the Environmental section of the Policy Plan for Fairfax County contained in Vol. 1 of the Comprehensive Plan.

**EQAC:** Fairfax County Environmental Quality Advisory Council.

**E&SCO:** Erosion and Sediment Control Ordinance (Chapter 104 of the Fairfax County Code).

**EUTROPHIC:** A water body that has high nutrients and high plant growth.

**EUTROPHICATION:** The process by which lakes and streams are enriched by nutrients (usually phosphorus and nitrogen) which leads to excessive plant growth - algae in the open water, periphyton (*attached* algae) along the shoreline, and macrophytes (the higher plants we often call *weeds*) in the nearshore zone.

**FAR:** Floor Area Ratio. An expression of the amount of development intensity (typically, non-residential uses) on a specific parcel of land. FAR is determined by dividing the total square footage of gross floor area of buildings on a site by the total square footage of the site itself.

FCPA: Fairfax County Park Authority.

FCWA: Fairfax County Water Authority.

**GPS:** Global Positioning System.

**IMPERVIOUS SURFACE**: Any land area covered by buildings or paved with a hard surface such that water cannot seep through the surface into the ground.

**INFILL:** Development on vacant or underutilized sites within an area which is already mostly developed in an established development pattern or neighborhood.

**LID:** Low Impact Design. A suite of techniques that attempt to reproduce pre-development hydrology in order to reduce runoff reaching streams and to promote groundwater recharge.

**MEP:** Maximum Extent Practicable.

**MGD:** Million Gallons per Day.

**MS4:** Municipal Separate Storm Sewer System. See VPDES for additional information.

**MWAA:** Metropolitan Washington Airports Authority.

**NPS:** Nonpoint Source (Pollution). Unlike pollution from industrial and sewage treatment plants, NPS pollution comes from many diffuse sources and is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, and coastal waters.

**NURP:** Nationwide Urban Runoff Program.

**NUTRIENT LOADING:** Discharging of nutrients from the watershed (basin) into a receiving water body (lake, stream, wetland); expressed usually as mass per unit area per unit time (kg/ha/yr or lbs/acre/year.

**NVBIA:** Northern Virginia Building Industry Association.

**NVRC:** Northern Virginia Regional Commission, formerly the Northern Virginia Planning District Commission.

**NVRPA:** Northern Virginia Regional Park Authority.

**NVSWCD:** Northern Virginia Soil and Water Conservation District.

**OWML:** Occoguan Watershed Monitoring Lab.

**PFM:** Public Facilities Manual. A technical text approved by the Board of Supervisors containing guidelines and standards which govern the design and construction of site improvements incorporating applicable federal, State and County Codes, specific standards of the Virginia Department of Transportation and the County's Department of Environmental Management.

**PHOSPHORUS:** Key nutrient influencing plant growth in lakes. Soluble reactive phosphorus  $(PO_4^{-3})$  is the amount of phosphorus in solution that is available to plants. Total phosphorus includes the amount of phosphorus in solution (reactive) and in particulate form.

**R-C District:** Residential-Conservation District of the Fairfax County Zoning Ordinance.

**RMA:** Resource Management Area (under the Chesapeake Bay Preservation Ordinance).

**RPA:** Resource Protection Area (under the Chesapeake Bay Preservation Ordinance).

**SEDIMENTATION:** The removal, transport, and deposition of detached soil particles by flowing water or wind. Sediment includes decaying algae and weeds and soil and organic matter eroded from the lake's watershed.

**SE/SP:** Special Exception/Special Permit. Uses, which by their nature, can have an undue impact upon or can be incompatible with other land uses and therefore need a site specific review. After review, such uses may be allowed to locate within given designated zoning districts if appropriate and only under special controls, limitations, and regulations. A special exception is subject to public hearings by the Planning Commission and Board of Supervisors with approval by the Board of Supervisors; a special permit requires a public hearing and

approval by the Board of Zoning Appeals. Unlike proffers, which are voluntary, the Board of Supervisors or BZA may impose reasonable conditions to assure, for example, compatibility and safety. See Article 8, Special Permits and Article 9, Special Exceptions, of the Zoning Ordinance.

**SPS:** Stream Protection Strategy. Often used in conjunction with the 2001 SPS Baseline Study produced by the Fairfax County Department of Public Works and Environmental Services.

**STORMWATER:** Precipitation and snowmelt runoff from roadways, parking lots, roof drains that is collected in gutters and drains.

**SWPD:** Stormwater Planning Division of the Department of Public Works and Environmental Services.

**TASK FORCE**: New Millennium Occoquan Watershed Task Force.

**TMDL:** Total Maximum Daily Load. A requirement of the federal Clean Water Act to establish a pollutant budget for streams violating State water quality standards.

**TKN:** Total Kjeldahl Nitrogen. Sum of ammonia and organic nitrogen forms.

**TP:** Total Phosphorus.

**TSS:** Total Suspended Solids.

**UOSA:** Upper Occoquan Sewage Authority.

**VACO:** Virginia Association of Counties.

**VDOT:** Virginia Dept. of Transportation.

**VPDES:** Virginia Pollutant Discharge Elimination System. Requires the County to obtain a permit from the Virginia Department of Environmental Quality to discharge stormwater from its municipal separate storm sewer system.

**VSWCB:** Virginia State Water Control Board.

**WATERSHED:** An area of land where all of the water that is under it or drains off of it goes into the same place.

**WRF:** Water Reclamation Facility (Upper Occoguan Sewage Authority).

WSPOD: Water Supply Protection Overlay District.